

What is claimed is:

1. A plating method, comprising:

5 filling a plating liquid containing metal ions and an additive into a plating space formed between a substrate and an anode disposed closely to the substrate so as to face the substrate; and

changing the concentration of the additive in the plating liquid filled into said plating space during a plating process.

10 2. The plating method according to claim 1, wherein the concentration of the additive in the plating liquid is adjusted by intermittently supplying the plating liquid into said plating space.

15 3. The plating method according to claim 1, wherein the concentration of the additive in the plating liquid is adjusted by supplementary addition of the additive to said plating space.

20 4. The plating method according to claim 1, wherein the concentration of the additive in the plating liquid is adjusted by removal of the additive in the plating liquid.

25 5. The plating method according to claim 1, wherein the additive is a brightener, and the concentration of the brightener at the middle and later stages of the plating process is lower than that at the initial stage of the plating process.

6. The plating method according to claim 1, wherein the

additive is a leveler, and the concentration of the leveler at the middle and later stages of the plating process is higher than that at the initial stage of the plating process.

5           7. A plating apparatus, comprising:

          a substrate holder for holding a substrate so that a current can flow from a cathode to the substrate;

          an anode opposed to the substrate held by said substrate holder; and

10           a plating liquid introducing device for introducing a plating liquid into a plating space formed between the substrate and said anode in a batch process or an intermittent process.

          8. The plating apparatus according to claim 7, wherein a  
15   plating liquid impregnation material is provided in said plating space.

          9. The plating apparatus according to claim 7, further  
comprising a liquid introducing device for introducing into said  
20   plating space a liquid having a different additive concentration from the additive concentration of the plating liquid.

          10. The plating apparatus according to claim 9, wherein a  
plating liquid impregnation material is provided in said plating  
25   space.

          11. The plating apparatus according to claim 7, further comprising a temperature adjusting device for adjusting the

temperature of the plating liquid in said plating space.

12. A plating apparatus, comprising:

5 a substrate holder for holding a substrate so that a current  
can flow from a cathode to the substrate;

an anode opposed to the substrate held by said substrate  
holder; and

10 a moving device for moving a portion of the substrate facing  
said anode in such a state that an inner central portion of the  
surface of the substrate faces said anode for a longer time than  
an outer peripheral portion of the surface of the substrate faces  
said anode.

13. The plating apparatus according to claim 12, wherein said  
15 moving device comprises a substrate-rotating device for rotating  
the substrate.

14. The plating apparatus according to claim 12, wherein said  
moving device comprises an anode-rotating device for rotating said  
20 anode.

15. The plating apparatus according to claim 12, wherein said  
moving device comprises an anode-translating device for  
translating said anode.

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16. A plating apparatus, comprising:

a substrate holder for holding a substrate so that a current  
can flow from a cathode to the substrate; and

an anode opposed to the substrate held by said substrate holder,

wherein the distance between said anode and an inner central portion of the substrate is smaller than the distance between said  
5 anode and an outer peripheral portion of the substrate.

17. A plating apparatus, comprising:

a substrate holder for holding a substrate so that a current can flow from a cathode to the substrate;

10 an anode opposed to the substrate held by said substrate holder; and

a distance changing device for changing the distance between the substrate and said anode after initiation of plating.

15 18. A plating method, comprising:

disposing a substrate and an anode in such a state that the substrate faces said anode;

flowing a current between the substrate and said anode while supplying a plating liquid therebetween; and

20 moving a portion of the substrate facing said anode in such a state that an inner central portion of the surface of the substrate faces said anode for a longer time than an outer peripheral portion of the surface of the substrate faces said anode.

25 19. The plating method according to claim 18, wherein the portion of the substrate facing said anode is moved by rotation of the substrate.

20. The plating method according to claim 18, wherein the portion of the substrate facing said anode is moved by rotation of said anode.

5        21. The plating method according to claim 18, wherein the portion of the substrate facing said anode is moved by translation of said anode.

22. A plating method, comprising:  
10        disposing a substrate and an anode so that the substrate faces said substrate; and  
         flowing a current between the substrate and said anode while supplying a plating liquid therebetween,  
         wherein the distance between said anode and an inner central  
15        portion of the substrate is smaller than the distance between said anode and an outer peripheral portion of the substrate.

23. A plating method, comprising:  
         disposing a substrate and an anode so that the substrate faces  
20        said anode;  
         flowing a current between the substrate and said anode while supplying a plating liquid therebetween; and  
         changing the distance between the substrate and said anode after initiation of plating.

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